

ABSTRACT

Cowpea is an important leguminous crop in arid and semi- arid areas of eastern and northern Uganda where it is a source of both food and incomes. Cowpea productivity among smallholder farmers is however very low, estimated at less than 500kg ha^{-1} due to several factors among which viruses are a key constraint. Virus infected cowpea also produces grain with reduced protein content. The identity of viruses infecting the crop in Uganda is not fully known which makes it difficult to develop reliable assays for detection. Additionally, cowpea genotypes with good sources of are lacking. The studies presented in this thesis contribute to improved understanding of cowpea viruses, their identity, detection and their management in Uganda. Using next-generation sequencing (NGS), four viruses viz; *Cowpea aphid-borne mosaic virus* (CABMV; genus *Potyvirus*), *Peanut mottle virus* (PeMoV; genus *Potyvirus*), *Sugarcane mosaic virus* (SCMV; genus *Potyvirus*) and *Maize chlorotic mottle virus* (MCMV; genus *Machlomovirus*) were identified in virus symptomatic plants. With the exception of CABMV, the other viruses have never been reported on cowpea or known to infect cowpea. Due to the significant yield loss attributed to CABMV, a detection assay that uses reverse transcriptase polymerase chain reaction (RT-PCR) was designed and optimized for detection of the virus in leaves collected from infected plants. The diagnostic assay was able to detect strains of CABMV in Uganda. Deployment of this diagnostic assay will help scientists, seed producers and crop inspectors in facilitating early detection of virus-infected plants, epidemiological studies, implementation of control measures, provision of virus-free planting material, international exchange of germplasm and quarantine protection. Five cowpea genotypes; WC48, MU19, WC33, WC18 and NE43 with good levels of field virus resistance to natural infection were also identified. These genotypes are potential donors of resistance for improvement of susceptible varieties but could also be directly grown by farmers.